

Contents

Illustrations	xi
Authors' preface	xvii
Acknowledgments	xix
Part I. The pieces: people, institutions, rockets and spacecraft	1
1. Space race	3
First on the Moon, first on Venus, and first on Mars	3
2. Key players	5
Introduction	5
Minister	9
Founder and Chief Designer of the Soviet space program	9
President of the Soviet Academy of Sciences	11
Chief Designers and Directors of the design bureaus	12
Directors of the science institutions	17
3. Key institutions	21
Party, government and military	21
Design bureaus	22
The Academy of Sciences and its research institutions	25
Launch complex	26
Communication and tracking facilities	27
4. Rockets	31
Early Soviet rocket development	31
The Cold War race to build an ICBM	33
R-7 ICBMs and Sputnik	34
R-7E and the early Luna probes	36
R-7M: The 'Molniya' lunar and planetary launch vehicle	37
The Proton launcher	42
N-1 Moon rocket	45

5. Spacecraft	49
Lunar spacecraft	49
Planetary spacecraft	54
Part II. Putting the pieces together: flying to the Moon, Venus and Mars	67
6. Breaking free of Earth	69
Timeline: Aug 1958–Sep 1960	69
The Ye-1 lunar impactor series: 1958–1959	69
The Ye-2 and Ye-3 lunar flyby series: 1959–1960	78
7. Launching to Mars and Venus	87
Timeline: Oct 1960–Feb 1961	87
The first launch to Mars: 1960	88
The first Venus spacecraft: 1961	94
8. New spacecraft, new failures	101
Timeline: Aug 1961–Nov 1962	101
A better spacecraft: a second try at Venus: 1962	101
The first Mars spacecraft: 1962	108
9. Three more years of frustration	115
Timeline: Jan 1963–Dec 1965	115
The Ye-6 lunar lander series: 1963–1965	117
A new spacecraft and another try for Mars: 1963–1965	126
The second Venus spacecraft: 1964	133
Two frustrating missions at Venus: 1965	138
10. Finally success at the Moon and Venus, but Mars eludes	143
Timeline: Jan 1966–Nov 1968	143
The Ye-6M lunar lander series: 1966	145
The Ye-6 lunar orbiter series: 1966–1968	152
The first success at Venus: 1967	161
The Zond circumlunar series: 1967–1970	169
11. Robotic achievements in the shadow of Apollo	181
Timeline: Dec 1968–Apr 1970	181
Following up at Venus: 1969	183
The Ye-8 lunar rover series: 1969–1973	188
The N-1 lunar mission series: 1969–1972	202
A bold, new program for Mars: 1969	206
The Ye-8-5 sample return series: 1969–1976	215
12. Landing on the Moon, Venus and Mars	233
Timeline: Aug 1970–Feb 1972	233
Reaching the surface of Venus: 1970	234
The first lander on Mars: 1971	240
The Ye-8 lunar orbiter series: 1971–1974	263

13. Closeouts on a Venus spacecraft, a Moon rocket, and desperation at Mars	267
Timeline: Mar 1972–Dec 1973	267
Science on the surface of Venus: 1972	268
A massive assault on Mars fails: 1973	275
The hiatus in Soviet Mars missions: 1974–1988	287
14. Turning from the Moon and Mars to Venus	291
Timeline: 1974–1976	291
A new, sophisticated Venus lander: 1975	292
15. Repeating success at Venus	311
Timeline: 1977–1978	311
Drilling into Venus: 1978	312
16. Back to Venus again	321
Timeline: 1979–1981	321
Color pictures from the surface of Venus: 1981	321
17. And back to Venus yet again	333
Timeline: 1982–1983	333
Piercing the cloudy veil of Venus: 1983	333
18. The International Comet Halley campaign	343
Timeline: 1984–1985	343
The Venus-Halley campaign: 1984	344
19. Another try at Mars and its moon Phobos	367
Timeline: 1986–1988	367
Back to Mars: 1988	368
20. The last gasp: Mars-96	387
Timeline: 1989–1996	387
A debilitating attempt at Mars in 1996	388
21. The Soviet lunar and planetary exploration legacy	407
A historical synopsis	407
The good, the bad and the sad	408
A new beginning rises from a cherished legacy	411
Appendices	415
A. Early spacecraft ‘tail numbers’	415
B. USSR lunar and planetary spacecraft families	416
C1. USSR lunar mission record	421
C2. USA robotic lunar mission record	423
D1. USSR Mars mission record	424
D2. USA Mars mission record	425
E1. USSR Venus mission record	426
E2. USA Venus mission record	427
F. Space exploration milestones in the 20th Century	428

x **Contents**

G. Timeline of planetary exploration missions in the 20th Century 430
H. USSR lunar and planetary probe locations 441

Bibliography. 443
Index 449



<http://www.springer.com/978-1-4419-7897-4>

Soviet Robots in the Solar System

Mission Technologies and Discoveries

Huntress, JR., W.T.; Marov, M.Y.

2011, XX, 453 p. 232 illus., 29 illus. in color., Softcover

ISBN: 978-1-4419-7897-4